

Applicant: Xuekui Lan et al.
Application No.: 09/763,214
Response to Office action dated Mar. 23, 2005
Amendment dated June 13, 2005

Claim Listing

1. (currently amended) Apparatus ~~(20, 20b)~~ for coating a traveling paper web ~~(w)~~ with a film of coating, the apparatus operatively associated with an adjacent backing roll ~~(14, 14b)~~ and comprising, in combination:
 - a coater head ~~(22, 22b)~~ having an inlet ~~(24, 24b)~~ for receiving a supply of fresh coating, the inlet having a first cross section;
 - a mixing chamber ~~(26, 26b)~~ in the coater head in fluid communication with the inlet for receiving the supply of fresh coating, the mixing chamber having a second cross section larger than the first cross section so that a flow of coating moving from the inlet to the mixing chamber diverges;
 - a feed channel ~~(28, 28b)~~ in the coater head, wherein the feed channel is in fluid communication with the mixing chamber for receiving coating from the mixing chamber, and wherein the feed channel is separate and distinct from the mixing chamber, and wherein the feed channel has a third cross section which is smaller than the second cross section so that a flow of coating moving from the mixing chamber to the feed channel converges;
 - a baffle ~~(30, 30b)~~ mounted in the apparatus and operatively associated with the feed channel ~~(28, 28b)~~ and having an edge ~~(32, 32b)~~ disposed in spaced adjacency with the surface ~~(15)~~ of the backing roll, and substantially parallel thereto, so as to form an overflow gap ~~(60, 60b)~~ with either the paper web surface to be coated, when the web is supported on the backing roll surface, or the backing roll surface, when the paper web is not supported on the backing roll surface, and to provide for the escape of coating therethrough when coating is flowed through the feed channel;
 - a coating chamber ~~(18, 18b)~~ in the coater head in fluid communication with the feed

Applicant: Xuekui Lan et al.
Application No.: 09/763,214
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channel, and so constructed and arranged as to be open toward the backing roll for applying a film of coating to either the paper web surface to be coated, when the web is supported on the backing roll surface, or on the backing roll surface, when the paper web is not supported on the backing roll surface; and recirculation means ~~(48, 50, 54, 58, 48b, 50b, 54b, 58b)~~ in the coater head, and in fluid communication with the coating chamber and the mixing chamber for returning coating from the coating chamber to the mixing chamber to be combined with the fresh coating, and to establish, together with the feed channel, a continuous flow loop for circulation of coating within the coater head~~[[;]]~~, the recirculation means including a plurality of flow-metering orifices ~~(58, 58b)~~ linking a channel ~~(54, 54b)~~ with the mixing chamber ~~(26, 26b)~~, said orifices being so constructed and arranged as to form an acute angle with the inlet ~~(24, 24b)~~.

2. (currently amended) ~~Apparatus~~ The apparatus for coating a traveling paper web as ~~set forth in~~ of claim 1, wherein:

a flexible blade is ~~(36, 36b)~~ mounted in the coater head to define, with the surfaces of the backing roll, the coating chamber ~~(18, 18b)~~ which extends downstream in the apparatus, the blade having a proximate end mounted in the coater head and a distal end extending downstream.

Applicant: Xuekui Lan et al.
Application No.: 09/763,214
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3. (currently amended) ~~Apparatus~~ The apparatus for coating a traveling paper web as set forth in of claim 1, wherein:

the coater head includes a stabilizer surface (~~51, 51b~~) for defining a part of the coating chamber for assisting in the flow of coating downstream and against either the surface of the paper web to be coated or on the surface (~~15~~) of the backing roll.

Applicant: Xuekui Lan et al.
Application No.: 09/763,214
Response to Office action dated Mar. 23, 2005
Amendment dated June 13, 2005

4. (currently amended) Apparatus for coating a traveling paper web with a film of coating, the apparatus operatively associated with an adjacent backing roll and comprising, in combination:

a coater head having an inlet for receiving a supply of fresh coating;

a mixing chamber in the coater head in fluid communication with the inlet for receiving the supply of fresh coating;

a feed channel in the coater head in fluid communication with the mixing chamber for receiving coating from the mixing chamber;

a baffle mounted in the apparatus and operatively associated with the feed channel and having an edge disposed in spaced adjacency with the surface of the backing roll, and substantially parallel thereto, so as to form an overflow gap with either the paper web surface to be coated, when the web is supported on the backing roll surface, or the backing roll surface, when the paper web is not supported on the backing roll surface, and to provide for the escape of coating therethrough when coating is flowed through the feed channel;

a coating chamber in the coater head in fluid communication with the feed channel, and so constructed and arranged as to be open toward the backing roll for applying a film of coating to either the paper web surface to be coated, when the web is supported on the backing roll surface, or on the backing roll surface, when the paper web is not supported on the backing roll surface;

recirculation means in the coater head, and in fluid communication with the coating chamber and the mixing chamber for returning coating from the coating chamber to the mixing chamber to be combined with the fresh coating, and to establish, together with the feed channel, a continuous flow loop for circulation of coating within the coater head;

Applicant: Xuekui Lan et al.
Application No.: 09/763,214
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the recirculation means including a plurality of flow-metering orifices linking a channel with the mixing chamber, said orifices being so constructed and arranged as to form an acute angle with the inlet; and Apparatus for coating a traveling paper web as set forth in claim 3, further including:

a flexible blade (36, 36b) mounted in the coater head and having a distal end (38) extending downstream therein, and defining, with the surface of the backing roll (14, 14b), the coating chamber (18, 18b) on one surface (49) of the blade, and defining, with the coater head, a recirculation channel (54, 54b) on the other surface (52, 52b) of the blade.

5-7. (canceled)

8. (currently amended) Apparatus The apparatus for coating a traveling paper web as set forth in of claim 1, further comprising including:

a metering rod holder (42, 42b) mounted in the apparatus for holding a rotatable metering rod (40, 40b) for nipping engagement with either the coated paper web or the surface of the associated backing roll downstream of the coating chamber; and a metering rod (40, 40b) rotatably mounted in the metering rod holder.

9. (currently amended) Apparatus The apparatus for coating a traveling paper web set forth in of claim 8, further comprising:

drive means (64, 64b) operatively connected to the metering rod for rotating the metering rod while the metering rod is in nipping, coating metering engagement with the coating material against either the coated web (W) or the surface of the backing roll.

Applicant: Xuekui Lan et al.
Application No.: 09/763,214
Response to Office action dated Mar. 23, 2005
Amendment dated June 13, 2005

10. (currently amended) A method for coating a traveling paper web (W) with a film of coating, the paper web being either supported on the surface of a ~~rotatable~~ backing roll rotating in a downstream direction, or nipped against the surface (15) of the backing roll (14; 14b), the method comprising the steps of:

- [[1]] introducing a fresh supply of coating (25, 25b) into a mixing chamber of a coater head (22, 22b)[[; 2]] and directing the fresh supply of coating into [[a]] the mixing chamber (26, 26b) in the coater head through a plurality of diverging parallel holes aligned in a cross-machine direction;
- [[3]] flowing [[the]] a coating flow from the mixing chamber in a converging flow into, and through, a feed channel (28, 28b) in the coater head;
- [[4]] dividing the coating exiting the feed channel into a first portion constituting a major part of the flow from the mixing chamber and a second portion[[s]] constituting a minor part of the flow from the mixing chamber (12, 11; 12b, 11b);
- [[5]] directing the first portion (12, 12b) into a coating chamber in the coater head, and directing the second portion (11, 11b) in an upstream direction over a baffle (30, 30b) disposed in spaced adjacency with either the paper web supported on the backing roll, or the surface of the backing roll, to define a gap (60, 60b) therebetween, the second portion being sufficient to seal the gap from air moving with either the traveling paper web or the surface of the backing roll;
- [[6]] flowing the coating in the coating chamber in the downstream direction therein while maintaining a pressurized interface between the coating material and either the paper web, when the paper web is supported on the surface of the backing roll[[, or]] to coat the paper web, or maintaining a pressurized

Applicant: Xuekui Lan et al.
Application No.: 09/763,214
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Amendment dated June 13, 2005

- interface between the coating material and the surface of the backing roll[[,]] when the paper web is nipped against the surface of the backing roll downstream of the interface to coat the paper web;
- [[7]] flowing the coating from the coating chamber into a recirculation chamber (~~54~~, ~~54b~~);
- [[8]] directing the coating from the recirculation chamber into the mixing chamber (~~22~~, ~~22b~~) through a plurality of flow-metering orifices formed in the coater head which are aligned parallel with one another in the cross-machine direction and which connect the recirculation chamber with the mixing chamber, the direction of flow of coating from the recirculation chamber being at an acute angle to the direction of flow of the fresh supply of coating being directed into the mixing chamber; and
- [[9]] mixing the coating from the recirculation chamber (~~54~~, ~~54b~~) with the fresh coating in the mixing chamber (~~26~~, ~~26b~~).

11. (new) The method of claim 10 further comprising the step of metering the film of coating against the surface of the backing roll or the paper web with a metering rod counter-rotating relative to the rotation direction of the backing roll.

12. (new) The method of claim 10 further comprising the step of using a flexible blade mounted in the coater head to form the baffle, the flexible blade defining the coating chamber and the recirculation channel.